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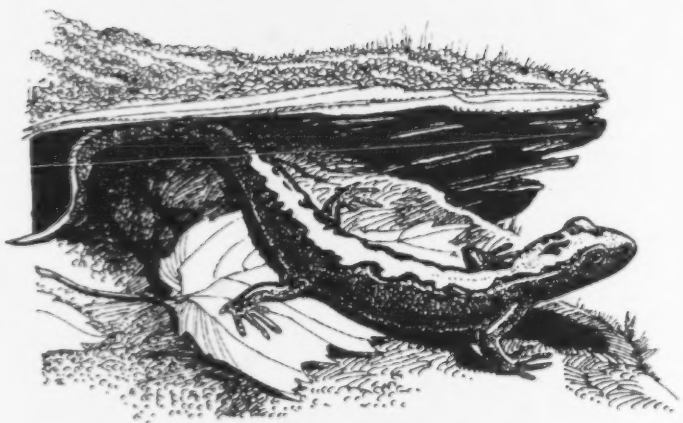
RESEARCHING AMPHIBIAN NUMBERS IN ALBERTA (RANA): 2002 PROVINCIAL SUMMARY



Alberta Species at Risk Report No. 74

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

RESEARCHING AMPHIBIAN NUMBERS IN ALBERTA (RANA): 2002 PROVINCIAL SUMMARY

Lisa Wilkinson and Stephen Hanus

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RANA has succeeded over the years through financial and in-kind support from a number of agencies, as well as the continued support of dedicated individuals. This program is a testament to the possibilities and kind of success that can occur when supportive individuals and agencies believe in a common goal.

EXECUTIVE SUMMARY

Five RANA (Researching Amphibian Numbers in Alberta) sites were operated in 2002: Kananaskis (Bow Valley), Hinton (Athabasca Valley), Lesser Slave Lake Provincial Park, Saskatoon Island Provincial Park, and Meanook Biological Research Station.

The types and numbers of amphibian species captured and observed in 2002 were, for the most part, similar to previous years. Four species were captured: boreal chorus frogs, boreal toads, long-toed salamanders, and wood frogs. Shoreline pond surveys were conducted at 185 ponds within four RANA study areas. Species observed, in order of decreasing abundance, were: wood frogs (the most ubiquitous), long-toed salamanders, boreal toads, boreal chorus frogs, Columbia spotted frogs, and northern leopard frogs. No Canadian toads were observed, despite having several study sites within their range. Regional and provincial summaries of amphibian morphological characteristics are provided in this report, along with summaries of capture rates for all species encountered at each of the RANA trapping ponds. Educational programs reached approximately 6700 people.

1.0 INTRODUCTION

Field data collection for the Researching Amphibian Numbers in Alberta (RANA) program was initiated in 1997 in response to the global decline of amphibians. RANA has two primary objectives: 1) collect long-term data on amphibian species populations in Alberta, and 2) provide public education on the importance of amphibians and wetland conservation. Two sites were operated in 1997, and since that time, an additional five monitoring sites were established, although not all sites can be operated every year.

There were five active sites in 2002: Lesser Slave Lake Provincial Park (est. 1997), Saskatoon Island Provincial Park (est. 1999), Meanook Research Station (est. 1997), Athabasca Valley (Hinton; est. 2000), and Bow Valley (Kananaskis; est. 1998). Two sites were not operated in 2002 due to logistical constraints: Cypress Hills Provincial Park and Beaverhill Lake. However, a park interpreter was able to conduct a limited number of pond surveys in Cypress Hills.

The following species have been captured or observed in the RANA program: wood frogs (*Rana sylvatica*), boreal chorus frogs (*Pseudacris maculata*), Columbia spotted frogs (*Rana luteiventris*), northern leopard frogs (*Rana pipiens*), boreal toads (*Bufo boreas*), Canadian toads (*Bufo hemiophrys*), long-toed salamanders (*Ambystoma macrodactylum*), and tiger salamanders (*Ambystoma tigrinum*). The only two amphibian species that have not been observed during the RANA program are the great plains toad (*Bufo cognatus*) and the plains spadefoot toad (*Spea bombifrons*), both of which are found in the grassland natural region (Alberta Environmental Protection 1994), which is not currently represented. Only one Canadian toad has been captured since the establishment of the RANA program, which occurred in 1998 at Lesser Slave Lake.

Few of Alberta's amphibians are considered 'secure'. Of the species encountered in the RANA program, the northern leopard frog is 'threatened', the Canadian toad 'data deficient' ('may be at risk'), and the long-toed salamander and spotted frog are 'sensitive' (Alberta Sustainable Resource Development 2000). Long-toed salamanders are the focal species in Hinton and Kananaskis due to the current provincial objective to monitor their population distribution, size, and trends over at least five years. Additional details of the salamander program are in Wilkinson and Hanus (2003a).

Public education has always been a fundamental component of the RANA program. Education for school groups and park visitors take the form of presentations, public event displays, guided hikes, and other activities. Technical presentations are given to land-use managers (industry and government), and at biological conferences. In conjunction with RANA educational programs, the Alberta Amphibian Monitoring Program (AAMP) is promoted. This program encourages members of the public to record and submit amphibian observations throughout the province. An instruction manual, including identification photos and a tape of frog and toad calls, are also provided to interested individuals.

This document is a compilation of 2002 field results from each RANA site. Individual field summary reports for 2002 have been developed for Hinton (Hanus 2003), Kananaskis (Rose 2002), Lesser Slave Lake Provincial Park (Chittenden 2002), Saskatoon Island Provincial Park (Pollock 2002), and Meanook Biological Research Station (Wilkinson and Hanus 2003).

2.0 STUDY AREA

The RANA program selected sites distributed across Alberta (Figure 1) to represent a variety of natural regions (Alberta Environmental Protection 1994). Seven sites have been established, two of which were not operated in 2002 (Cypress Hills and Beaverhill Lake). Cypress Hills is located in a unique montane ecosystem within the grassland natural region, Kananaskis (Bow Valley) is located in the rocky mountain and foothills natural regions, Beaverhill Lake is located in the parkland natural region, the Hinton (Athabasca Valley) site is located in the foothills natural region, and the Meanook Biological Research Station, Lesser Slave Lake and Saskatoon Island Provincial Park sites are all located in the boreal forest natural region. In addition, pond surveys were conducted in and around Banff and Jasper National Parks, and in the Grande Cache area, as part of the long-toed salamander monitoring program, details are in Wilkinson and Hanus (2003a).

Figure 1. Alberta distribution of RANA sites in Alberta.

3.0 METHODS

Methods for surveying and capturing long-toed salamanders and other amphibians followed Pretzlaw *et al.* (2002), and are summarized below. Any variations to the methods are included in the individual site reports.

3.1 Pitfall Trapping

In each RANA survey area, there is one pond set up for pitfall trapping. The pond is completely or partially encircled with drift net fencing (Figure 2A). Pitfall traps are placed at 10 m intervals on either side of the fence. Theoretically, amphibians travelling to or from the pond to breed will be intercepted by the fence and travel along the barrier until they fall into a trap. Traps consist of two 6 inch plastic flower pots taped together, creating a 12 inch deep trap (Figure 2B). Traps are covered by a square of coroplast, a sturdy and water resistant plastic, held above the traps by 6 inch nails. Trap covers ensure that amphibians are protected from excessive exposure to sun, which can lead to desiccation, and prevent flooding from rainfall. The following items are placed in each trap: a sponge, which is refreshed regularly to retain moisture; a rock that serves as a perch or hiding place; and a stick protruding past the top of the trap to allow small mammals to escape.

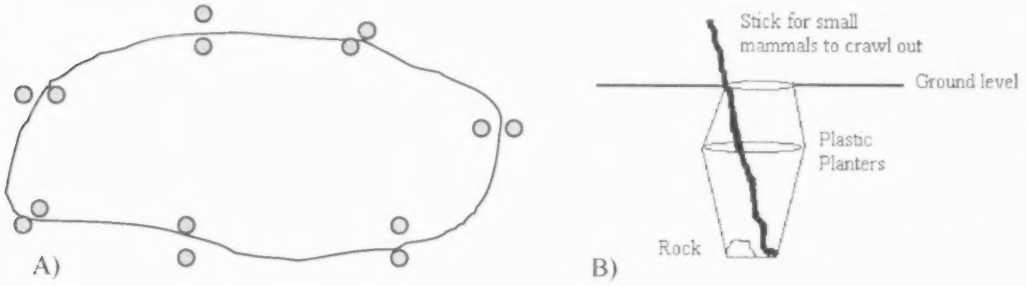

Figure 2. Layout of fencing and pitfall traps (A), and close-up of pitfall trap design (B).

Trapping schedules varied slightly between sites, but traps were generally set during the spring breeding season (May to early June), and late summer (August to early September) when young-of-the-year disperse from the ponds. The Meanook site was operated from July to mid-August for logistic reasons. Throughout the trapping sessions, traps were checked daily or every other day. Traps were generally closed during mid summer when amphibian movement to and from ponds declines. Captured animals were identified, sexed (during breeding), measured, weighed, and released on the opposite side of the fence from which they were captured. Other morphological characteristics, such as presence of dorsal stripes and malformations were also recorded. Generally, long-toed salamanders and wood frogs less than 2.0 g were classified as a young-of-the-year, those over 2.0 g were classified as adults or juveniles (other morphological characteristics were taken into consideration when classifying age). Small individuals captured at the beginning of the season were presumed to be juveniles (young-of-the-year from the previous season). Age and sex differentiation was not possible for all species. Researchers used latex gloves when handling amphibians to avoid contaminating amphibians with oils or hand lotion. Animals being released away from the pond were moistened and placed in a sheltered location; extra care was taken on hot days, releasing

amphibians early or late in the day to prevent desiccation. Environmental data were also collected, including air and water temperature, pond pH, water depth, and other ambient conditions.

At the end of each trapping session, traps were closed by pushing the coroplast cover flush to the ground, and were covered with dirt and a large rock to ensure animals could not enter. The conditions at Saskatoon Island made inverting pitfall traps the best closure method. Also, sections of fence were opened at several locations around the pond to allow animals to pass through.

3.2 Pond Surveys

Pond surveys were conducted to identify presence of breeding amphibians through observations of eggs, larvae/tadpoles, young-of-the-year, or adults, as well as to hear vocalizations in the spring. Survey efforts were most intensive during spring egg-laying in May and June, although some ponds were visited later in the summer to look for presence of larvae and tadpoles.

Surveys were conducted by walking along the perimeter of a pond, or using transects for large and/or partially inaccessible waterbodies, and looking for signs of amphibian presence. Surveys could not be conducted under excessively windy or rainy conditions because the surface of the water was disturbed. Similarly, care was taken not to disturb the surface of the water around the shoreline. Data recorded included number of salamander eggs, number of frog egg masses, and number of toad egg strings. For observations of larvae and tadpoles a specific count was made if possible, otherwise qualitative observations were made using estimates of few, moderate, or abundant (a similar system applies to vocalizations). Observations of adults were also recorded. Environmental data were collected as per pitfall trapping ponds, and GPS locations were recorded for all ponds surveyed.

At some sites, the length of survey distance was recorded, allowing for future calculations of number of eggs/meter, enabling relative abundance comparisons between years and between sites regardless of survey distances.

3.3 Reports and Data Storage

In addition to this summary report, a report was produced for each RANA site and widely distributed to local government offices, stakeholders, funding agencies, participants and volunteers, and other interested parties. All data have been electronically recorded and archived, and have been incorporated into the provincial government Biodiversity/Species Observation Database (BSOD).

4.0 RESULTS

4.1 Pitfall Trapping

Results from spring, mid summer, and late summer pitfall trapping sessions are provided below. An overall summary from the entire 2002 field season for each RANA site is also provided in Appendix 1. In addition, amphibian capture data from each RANA site since their establishment is provided in Appendix 2.

4.1.1 Spring Pitfall Trapping Session

Four of the five active RANA sites were open during the spring trapping session in 2002, and a total of five amphibian species were captured (Table 1). Boreal chorus frogs were the most commonly caught amphibian species among the RANA sites, but nearly all of these captures were at Lesser Slave Lake. Wood frogs were the second most common species captured, and were present at all RANA sites, followed by long-toed salamanders, which were observed only at the Hinton and Kananaskis sites. Boreal toads were captured at all RANA sites during the spring trapping session with one exception (Saskatoon Island), but were the least abundant species.

Table 1. Spring amphibian captures and morphological characteristics from Alberta RANA sites in 2002.

RANA SITE	Species*	Age**	Total #	# Per Trap Night	Sex			Snout-to-Vent Length (cm)		Mass (g)	
					Male	Female	Unk.	Mean	Range	Mean	Range
Hinton	**BOTO**	**Adult**	**28**	0.038	8	8	12	7.2	5.3-8.9	41.0	12.0-75.0
May 13-June 29	**LTSA**	**Adult**	**114**	0.149	41	73	0	6.5	5.0-8.1	5.4	2.6-9.5
(767 trap nights)	**WOFR**	**Adult**	**56**	0.073	32	16	8	4.4	3.7-5.3	9.4	4.0-15.0
		Juvenile	**1**	0.001	0	0	1	2.4	N/A	1.5	N/A
		Overall	**57**	0.074	32	16	9	4.4	2.4-5.3	9.2	1.5-15.0
Kananaskis	**BOTO**	**Adult**	**6**	0.014	1	0	5	6.0	4.8-6.9	26.3	11.8-36.5
May 21-June 15	**LTSA**	**Adult**	**93**	0.224	51	41	1	6.4	5.3-7.8	5.1	3.0-9.0
(416 trap nights)	**WOFR**	**Adult**	**5**	0.012	0	0	5	4.3	3.8-5.2	9.2	6.5-14.9
Lesser Slave Lake	**BCFR**	**Overall**	**282**	0.320	0	0	282	2.4	1.2-3.1	1.4	0.3-2.5
May 12 – June 2	**BOTO**	**Overall**	**20**	0.023	0	0	20	6.2	2.5-7.3	29.8	1.5-55.0
(880 trap nights)	**WOFR**	**Adult**	**112**	0.127	104	7	1	4.4	2.5-5.4	10.1	2.0-21.0
		Juvenile	**7**	0.008	4	0	3	2.3	2.0-2.5	1.4	1.0-1.8
		Overall	**119**	0.135	108	7	4	4.3	2.0-5.4	9.6	1.0-21.0
Saskatoon Island	**BCFR**	**Overall**	**2**	0.004	1	1	0	2.4	2.2-2.5	0.8	0.5-1.0
May 10– June 26	**WOFR**	**Adult**	**69**	0.127	7	62	0	4.6	2.9-6.0	10.8	3.5-26.0
(540 trap nights)											
Totals	**BCFR**	**Overall**	**284**	**N/A**	**1**	**1**	**282**	**2.4**	**1.2-3.1**	**1.4**	**0.3-2.5**
(2603 trap nights)	**BOTO**	**Overall**	**54**	**N/A**	**9**	**8**	**37**	**6.7**	**2.5-8.9**	**35.1**	**1.5-75.0**
	LTSA	**Adult**	**207**	**N/A**	**92**	**114**	**1**	**6.5**	**5.0-8.1**	**5.2**	**2.6-9.5**
	WOFR	**Adult**	**242**	**N/A**	**143**	**85**	**14**	**4.5**	**2.5-6.0**	**10.1**	**2.0-26.0**
		Juvenile	**8**	**N/A**	**4**	**0**	**4**	**2.3**	**2.0-2.5**	**1.4**	**1.0-1.8**
		Overall	**250**	**N/A**	**147**	**85**	**18**	**4.4**	**2.0-6.0**	**9.8**	**1.0-26.0**

*BCFR (Boreal Ch us Frog), BOTO (Boreal Toad), LTSA (Long-Toed Salamander), WOFR (Wood Frog).
**Adult LTSA and WOFR were 2.0g or more, whereas Juvenile LTSA and WOFR were <2.0g.

4.1.2 Mid-Summer Pitfall Trapping Session

Mid-summer pitfall trapping was conducted at Meanook and Saskatoon Island. Wood frogs were the most abundant species at both sites, and were the only species captured at Saskatoon Island (Table 2). Three amphibian species were captured at the Meanook RANA site (boreal chorus frogs, boreal toads, and wood frogs; Table 2).

Table 2. Mid-summer amphibian captures and morphological characteristics from the Meanook and Saskatoon Island RANA sites in 2002.

RANA SITE	Species*	Age**	Total #	# Per Trap Night	Sex			Snout-to-Vent Length (cm)		Mass (g)	
					Male	Female	Unk.	Mean	Range	Mean	Range
Meanook July 7 – Aug. 6 (714 trap nights)	**BCFR**	**Overall**	**1**	0.001	0	0	1	3.1	N/A	2.5	N/A
	BOTO	**Overall**	**12**	0.017	0	0	12	3.3	2.7-5.7	4.0	2.5-14.0
	WOFR	**Adult**	**43**	0.060	0	0	43	3.1	1.2-5.0	4.4	2.0-14.0
		YOY	**22**	0.031	0	0	22	1.9	1.2-3.0	1.1	0.5-1.5
		Overall	**65**	0.091	0	0	65	2.7	1.0-5.0	3.2	0.5-14.0
Saskatoon Island July 11 – July 31 (60 trap nights)	**WOFR**	**Adult**	**32**	0.533	0	32	0	4.3	3.6-5.4	9.2	6.0-19.0
Totals (774 trap nights)	**BCFR**	**Overall**	**1**	**N/A**	**0**	**0**	**1**	**3.1**	**N/A**	**2.5**	**N/A**
	BOTO	**Overall**	**12**	**N/A**	**0**	**0**	**12**	**3.3**	**2.7-5.7**	**4.0**	**2.5-14.0**
	WOFR	**Adult**	**75**	**N/A**	**0**	**32**	**43**	**3.6**	**1.2-5.4**	**6.5**	**2.0-19.0**
		YOY	**22**	**N/A**	**0**	**0**	**22**	**1.9**	**1.2-3.0**	**1.1**	**0.5-1.5**
		Overall	**97**	**N/A**	**0**	**32**	**65**	**7.2**	**1.0-6.0**	**5.2**	**0.5-19.0**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), LTSA (Long-Toed Salamander), WOFR (Wood Frog).
**Adult LTSA and WOFR were 2.0g or more, whereas YOY (young-of-the-year) LTSA and WOFR were <2.0g.

4.1.3 Late Summer Pitfall Trapping Session

Four of the five active RANA sites were open during the late summer trapping session, and a total of five amphibian species were captured (Table 3). Of the species observed, long-toed salamanders were the most numerous, primarily due to the large number of young-of-the-year captured at the Kananaskis site. Other amphibian species captured, in decreasing order of abundance, were wood frogs, boreal toads, boreal chorus frogs, and Columbia spotted frogs. The majority of amphibians captured were young-of-the-year (Table 3).

Table 3. Late summer amphibian captures and morphological characteristics from Alberta RANA sites in 2002.

RANA SITE	Species*	Age**	Total #	# Per Trap Night	Sex			Snout-to-Vent Length (cm)		Mass (g)	
					Male	Female	Unk.	Mean	Range	Mean	Range
Hinton Aug. 9 – Oct. 2 (879 trap nights)	**BOTO**	**Overall**	**1**	0.001	0	1	0	8.5	N/A	83.0	N/A
	LTSA	**Adult**	**16**	0.018	6	6	4	5.6	3.4-7.7	4.2	2.0-10.4
		YOY	**88**	0.100	1	0	87	3.5	2.8-4.9	1.1	0.5-1.8
		Overall	**104**	0.118	7	6	91	3.8	2.8-7.7	1.6	0.5-10.4
	WOFR	**Adult**	**56**	0.063	19	7	30	4.4	3.0-5.5	9.7	4.8-16.4
		YOY	**62**	0.071	0	0	62	2.3	2.1-2.9	1.3	1.0-1.6
		Overall	**118**	0.134	19	7	92	3.3	2.1-5.5	5.3	1.0-16.4
Kananaskis Aug 17-Oct. 15 (944 trap nights)	**BOTO**	**Overall**	**33**	0.035	0	0	33	5.7	3.0-8.0	21.7	1.2-38.0
	CSFR	**Overall**	**3**	0.003	0	0	3	7.8	7.4-8.0	>58.3	55->60
	LTSA	**Adult**	**26**	0.028	1	0	24	4.7	3.5-6.5	3.1	2.0-6.5
		YOY	**347**	0.368	0	2	345	2.8	1.8-4.8	0.6	0.1-1.8
		Overall	**372**	0.394	1	2	369	2.9	1.8-6.5	0.8	0.1-6.5
	WOFR	**Adult**	**8**	0.008	0	0	8	4.6	4.1-5.3	11.5	8.0-16.5
		YOY	**200**	0.212	0	0	200	No Data	N/A	No Data	N/A
		Overall	**208**	0.220	0	0	208	N/A	N/A	N/A	N/A
Lesser Slave Lake Aug. 3 – Aug. 21 (800 trap nights)	**BCFR**	**Overall**	**17**	0.021	0	0	17	2.5	1.5-3.2	1.6	0.5-3.5
	BOTO	**Overall**	**136**	0.170	0	0	136	2.9	1.5-7.2	4.4	1.0-40.0
	WOFR	**Adult**	**56**	0.070	31	2	23	3.5	2.2-5.6	7.5	2.0-24.0
		YOY	**21**	0.026	0	0	21	2.1	1.8-2.5	1.3	1.0-1.5
		Overall	**77**	0.096	31	2	44	3.1	1.8-5.6	5.8	1.0-24.0
Saskatoon Island Aug. 1 – Aug. 19 (380 trap nights)	**BCFR**	**Overall**	**2**	0.005	0	2	0	2.5	2.5	1.0	1.0
	WOFR	**Adult**	**61**	0.161	3	58	0	3.9	2.4-7.0	7.2	2.0-20.0
		YOY	**3**	0.008	0	3	0	2.5	2.5	1.3	1.0-1.5
		Overall	**64**	0.168	3	61	0	3.8	2.5-7.0	7.0	1.0-20.0
Totals (3003 trap nights)	**BCFR**	**Overall**	**19**	**N/A**	**0**	**2**	**17**	**2.5**	**1.5-3.2**	**1.5**	**0.5-3.5**
	BOTO	**Overall**	**170**	**N/A**	**0**	**1**	**169**	**3.5**	**1.5-8.5**	**8.2**	**1.0-83.0**
	CSFR	**Overall**	**3**	**N/A**	**0**	**0**	**3**	**7.8**	**7.4-8.0**	**>58.3**	**55.0->60.0**
	LTSA	**Adult**	**41**	**N/A**	**7**	**6**	**28**	**5.0**	**3.4-7.7**	**3.5**	**2.0-10.4**
		YOY	**435**	**N/A**	**1**	**2**	**432**	**3.0**	**1.8-4.9**	**0.7**	**0.1-1.8**
		Overall	**476**	**N/A**	**8**	**8**	**460**	**3.1**	**1.8-7.7**	**0.9**	**0.1-1.8**
	WOFR	**Adult**	**181**	**N/A**	**53**	**67**	**61**	**4.0**	**2.2-7.0**	**8.3**	**2.0-24.0**
		YOY	**286**	**N/A**	**0**	**3**	**283**	**2.3**	**1.8-2.9**	**1.3**	**0.5-1.6**
		Overall	**467**	**N/A**	**53**	**70**	**344**	**3.4**	**1.8-7.0**	**5.9**	**0.5-24.0**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), CSFR (Columbia Spotted Frog), LTSA (Long-Toed Salamander), WOFR (Wood Frog).
**Adult LTSA and WOFR were 2.0g or more, whereas YOY (young-of-the-year) LTSA and WOFR were <2.0g.

4.3 Pond Surveys

Pond surveys in 2002 were conducted at 185 ponds in Cypress Hills, Hinton, Kananaskis, Lesser Slave Lake, and Saskatoon Island (Table 4). Additional surveys, which were considered extensions of RANA areas, were conducted in an attempt to locate long-toed salamander breeding sites. In the Kananaskis RANA area, additional surveys were conducted in and east of Banff National Park, and in the Hinton RANA area, additional surveys were conducted in Jasper National Park, south of the McLeod River, and in the Grand Cache area. Wood frogs were the most ubiquitous species, being observed at 55% of all ponds surveyed. The highest amphibian species diversity was at the Kananaskis site, where five species were observed. In Cypress Hills, northern leopard frogs were present at four of six ponds surveyed, with breeding evidence at each site.

Table 4. Amphibian species observations from all pond surveys in 2002.

RANA Site	Total # of Ponds Surveyed	Number of ponds in which species* were observed							
		BCFR	BOTO	CATO	CSFR	LTSA	NLFR	TISA	WOFR
Banff National Park	5	0	0	0	0	3	0	0	1
Cypress Hills	6	2	0	0	0	0	4	0	0
East of Banff	11	0	0	0	0	0	0	0	1
Grand Cache	4	0	1	0	0	0	0	0	2
Hinton	37	2	6	0	0	22	0	0	31
Jasper National Park	26	0	3	0	2	16	0	0	6
Kananaskis	66	1	16	0	13	15	0	0	41
Lesser Slave Lake	20	10	5	0	0	0	0	0	16
Meanook	0	0	0	0	0	0	0	0	0
Saskatoon Island	10	3	3	0	0	0	0	0	7
Totals:	**185**	**18**	**34**	**0**	**15**	**56**	**4**	**0**	**102**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), CATO (Canadian Toad), CSFR (Columbia Spotted Frog), LTSA (Long-toed Salamander), NLFR (Northern Leopard Frog), TISA (Tiger Salamander), WOFR (Wood Frog).

4.3 Education

Educational efforts took a variety of forms, including presentations, public displays, guided talks, plays, and children's activities. An estimated total of 6703 people were informed about amphibians, RANA, the AAMP, and wetland conservation throughout the province (Table 4). Details about presentations and activities are included in each RANA site report.

Table 4. Summary of educational/interpretive presentations given to the public from all Alberta RANA sites in 2002.

RANA Site	# of Presentations/Events	Approximate # of People
Hinton	18	765
Kananaskis	6+	3332
Lesser Slave Lake	10+	1079
Meanook	0	0
Saskatoon Island	32	1527
Totals:	**66+**	**6703**

5.0 DISCUSSION

The types of amphibian species captured and observed at RANA sites in 2002 were consistent with data from previous years. Wood frogs continue to be the most ubiquitous species, being widely distributed across the province and the most abundant species captured overall during RANA trapping. Long-toed salamanders were only found at the Hinton and Kananaskis sites, where sampling effort was focused on locating and monitoring this species, which likely accounts for their relative abundance in this study. Columbia spotted frogs were encountered in small numbers because they are found only in the Rocky Mountains within Alberta, at higher elevations than other amphibians. Boreal chorus frogs tend to be absent in the Rocky Mountains and uncommon in the foothills; however, they were the most common species encountered at the Lesser Slave Lake RANA site.

Northern leopard frogs were only observed in the Cypress Hills area, which is expected due to their limited range. Given their current status as 'threatened' it is encouraging that evidence of breeding (*i.e.* tadpole and young-of-the-year observations) was observed at four ponds. There were no observations of tiger salamanders, which had previously been detected at low numbers in Cypress Hills and Beaverhill Lake. Throughout the history of the RANA program, only one Canadian toad has been observed, captured in a pitfall trap at Lesser Slave Lake in 1998. Lesser Slave Lake is at the western edge of Canadian toad distribution in Alberta, which is roughly limited to the eastern half of the province. The Beaverhill Lake RANA site is located in Canadian toad range, but did not record any toads in its two years of operation. Similarly, Meanook is in the Canadian toad range and no observations have been made (this site only operates for approximately six to seven weeks in mid-summer). Although sampling effort within Canadian toad range has been minimal, it is concerning that this species has been encountered so rarely during the RANA program.

It is difficult to make inferences about amphibian population trends because the RANA program has been running for a relatively short period, during which time trapping and survey effort have varied as a result of limited resources. Continued monitoring and improved consistency will eventually yield data from which to draw meaningful conclusions regarding amphibian population trends. Currently, RANA data provide information on amphibian species presence and distribution, which also serve as a warning that a species may potentially be in decline due to its absence, or that certain breeding sites may be vulnerable. The data provide valuable information on timing of breeding cycles and how this relates to ambient conditions, as well as checking for possible deformities or disease. In addition, considerable life history information has been gathered. The variability in the numbers of species caught annually is in itself important, because it reinforces the need to conduct long-term monitoring.

Field data collection for the RANA program began in 1997 at Meanook Biological Research Station and Lesser Slave Lake Provincial Park. Although other sites have been added to the program, only five were operational in 2002. The continued operation of at least some of these sites is essential to gather long-term data on provincial amphibian populations. Continued operation of the Hinton and Kananaskis sites is important because they contain some of the few, isolated breeding populations of long-toed salamanders in the province, and have suitable habitat for Columbia spotted frogs. Attempts are underway to reinstate the program at Cypress Hills, the only RANA site with a threatened species. In addition, Cypress Hills represents a unique ecosystem in southern Alberta, providing valuable wildlife habitat. It is also important to recognize the importance of northern monitoring sites.

Clearly, all RANA sites are valuable, and the selection of which sites can be maintained is dependent not only on their location (*i.e.* habitat and amphibian associations), but on the availability of funding and resources. In some cases, provincial parks can share the operation of these sites while emphasizing the educational component. Similarly, grass roots organizations associated with provincial parks and important natural areas are fundamental in providing funds, and in some cases, volunteers. The RANA program has typically employed researchers to operate sites, while relying on volunteers for additional support.

Few amphibian species in Alberta are considered secure and wetland habitat is disappearing. Amphibian populations are known for their stochasticity, being strongly affected by environmental conditions. Long-term monitoring is therefore necessary to detect changes in population trends. Maintenance of at least some RANA sites, including sites in key habitats and with long monitoring histories, is strongly recommended. Aside from amphibian monitoring, the RANA program provides extensive public education about amphibians and wetland conservation, which is arguably as important as monitoring. In recognition of global amphibian declines and national efforts to track amphibian population trends, Alberta's maintenance of the RANA program is critical.

6.0 MANAGEMENT IMPLICATIONS

Management recommendations are limited given the relatively short period of time RANA has been operating. The primary recommendation is preservation of wetlands (*i.e.* prevent draining and contamination), particularly those wetlands known to have breeding populations of species at risk. Introduction of fish can also have a detrimental effect on amphibians, particularly long-toed salamanders. Minimizing potentially destructive activities around ponds is an additional consideration. On crown land, protective notations have been applied to create buffers around some breeding ponds. It is important to maintain communication with landowners and people who participate in activities around critical amphibian ponds in order to foster a sense of stewardship and appreciation for wetland ecosystems. Signage and education programs should be integrated with management activities.

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8.0 APPENDICES

Appendix 1. Overall summary of amphibian captures and morphological characteristics from Alberta RANA sites in 2002.

RANA SITE	Species*	Age**	Total #	# Per Trap Night	Sex			Snout-to-Vent Length (cm)		Mass (g)	
					Male	Female	Unk.	Mean	Range	Mean	Range
Hinton May 13 – June 29; Aug. 9 – Oct. 2 (1646 trap nights)	**BOTO**	**Overall**	**29**	0.018	8	9	12	7.2	5.3-8.9	42.5	12.0-83.0
	LTSA	**Adult**	**130**	0.079	47	79	4	6.4	3.4-8.1	5.2	2.0-10.4
		YOY	**88**	N/A	1	0	87	3.5	2.8-4.9	1.1	0.5-1.8
		Overall	**218**	0.132	48	79	91	5.3	2.8-8.1	3.6	0.5-10.4
	WOFR	**Adult**	**112**	0.068	51	23	38	4.4	3.0-5.5	9.5	4.0-16.4
		YOY	**63**	N/A	0	0	63	2.3	2.1-2.9	1.3	1.0-1.6
		Overall	**175**	0.106	51	23	101	3.7	2.1-5.5	6.6	1.0-16.4
Kananaskis May 21-June 15; Aug 17-Oct. 15 (1360 trap nights)	**BOTO**	**Overall**	**39**	0.029	1	0	38	5.8	3.0-8.0	22.4	1.2-38.0
	CSFR	**Overall**	**3**	0.002	0	0	3	7.8	7.4-8.0	>58.3	55.0->60.0
	LTSA	**Adult**	**118**	0.087	52	41	25	6.0	3.7-7.8	4.7	2.0-9.0
		YOY	**347**	N/A	0	2	345	2.8	1.8-4.8	0.6	0.1-1.8
		Overall	**465**	0.342	52	43	370	3.6	1.8-7.8	1.7	0.1-9.0
	WOFR	**Adult**	**13**	0.010	0	0	13	4.6	3.8-5.3	10.8	6.5-16.5
		YOY	**200**	N/A	0	0	200	1.9	1.8-2.2	0.6	0.5-0.8
		Overall	**213**	0.157	0	0	213	3.5	1.8-5.3	6.8	0.5-16.5
Lesser Slave Lake May 12 – June 2; Aug. 3 – Aug. 21 (1680 trap nights)	**BCFR**	**Overall**	**299**	0.178	0	0	299	2.4	1.2-3.2	1.4	0.3-3.5
	BOTO	**Overall**	**156**	0.093	0	0	156	3.3	1.5-7.3	7.7	1.0-55.0
	WOFR	**Adult**	**168**	0.100	135	9	24	4.1	2.2-5.6	9.2	2.0-24.0
		YOY	**28**	N/A	4	0	24	2.2	1.8-2.5	1.3	1.0-1.5
		Overall	**196**	0.117	139	9	48	3.8	1.8-5.6	8.1	1.0-24.0
Meanook July 7 – Aug. 6 (714 trap nights)	**BCFR**	**Overall**	**1**	0.001	0	0	1	3.1	N/A	2.5	N/A
	BOTO	**Overall**	**12**	0.017	0	0	12	3.3	2.7-5.7	4.0	2.5-14.0
	WOFR	**Adult**	**43**	0.060	0	0	43	3.1	1.2-5.0	4.4	2.0-14.0
		YOY	**22**	N/A	0	0	22	1.9	1.2-3.0	1.1	0.5-1.5
		Overall	**65**	0.091	0	0	65	2.7	1.0-5.0	3.2	0.5-14.0
Saskatoon Island May 10– June 26; July 11 – July 31; Aug. 1 – Aug. 19 (980 trap nights)	**BCFR**	**Overall**	**4**	0.004	1	3	0	2.5	2.5	0.9	0.5-1.0
	WOFR	**Adult**	**162**	0.165	10	152	0	4.3	2.4-7.0	9.1	2.0-26.0
		YOY	**3**	N/A	0	3	0	2.5	2.5	1.3	1.0-1.5
		Overall	**165**	0.168	10	155	0	4.2	2.4-7.0	8.9	1.0-26.0
Totals: (6383 trap nights)	**BCFR**	**Overall**	**304**	**N/A**	**1**	**3**	**300**	**2.4**	**1.2-3.2**	**1.4**	**0.3-3.5**
	BOTO	**Overall**	**236**	**N/A**	**9**	**9**	**218**	**4.2**	**1.5-8.9**	**14.1**	**1.0-83.0**
	CSFR	**Overall**	**3**	**N/A**	**0**	**0**	**3**	**7.8**	**7.4-8.0**	**>58.3**	**55.0->60.0**
	LTSA	**Adult**	**248**	**N/A**	**99**	**120**	**29**	**6.2**	**3.4-8.1**	**5.0**	**2.0-10.4**
		YOY	**435**	**N/A**	**1**	**2**	**432**	**3.0**	**1.8-4.9**	**0.7**	**0.1-1.8**
		Overall	**683**	**N/A**	**100**	**122**	**461**	**4.2**	**1.8-8.1**	**2.3**	**0.1-10.4**
	WOFR	**Adult**	**498**	**N/A**	**196**	**184**	**118**	**4.1**	**1.2-7.0**	**8.9**	**2.0-26.0**
		YOY	**316**	**N/A**	**4**	**3**	**309**	**2.3**	**1.0-3.0**	**1.2**	**0.5-1.8**
		Overall	**814**	**N/A**	**200**	**187**	**427**	**3.8**	**1.0-7.0**	**7.3**	**0.5-26.0**

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), CSFR (Columbia Spotted Frog), LTSA (Long-Toed Salamander), WOFR (Wood Frog).

**Adult LTSA and WOFR were 2.0g or more, whereas YOY (young-of-the-year) LTSA and WOFR were <2.0g; Juveniles have been included with YOY.

Appendix 2. Summary of historic amphibian captures at each RANA site.

A. Beaverhill Lake

Year	# Trap Nights	BCFR* Total # caught (# caught per trap night)	TISA* Total # caught (# caught per trap night)	WOFR* Total # caught (# caught per trap night)
1998	2073	17 (0.008)	1 (0.000)	182 (0.089)
1999	1257	1 (0.001)	1 (0.001)	111 (0.088)
2000	186	2 (0.011)	0 (0.000)	14 (0.075)
2001	0	N/A	N/A	N/A
2002	0	N/A	N/A	N/A

*BCFR (Boreal Chorus Frog), TISA (Tiger Salamander), WOFR (Wood Frog).

B. Cypress Hills Provincial Park

Year	# Trap Nights	BCFR* Total # caught (# caught per trap night)	NLFR* Total # caught (# caught per trap night)	TISA* Total # caught (# caught per trap night)
1998	180	2 (0.011)	5 (0.028)	31 (0.172)
1999	927	4 (0.004)	20 (0.022)	12 (0.013)
2000	1440	2 (0.001)	19 (0.013)	15 (0.010)
2001	0	N/A	N/A	N/A
2002	0	N/A	N/A	N/A

*BCFR (Boreal Chorus Frog), NLFR (Northern Leopard Frog), TISA (Tiger Salamander).

C. Hinton and Area

Year	# Trap Nights	BOTO* Total # caught (# caught per trap night)	LTSA* Total # caught (# caught per trap night)	WOFR* Total # caught (# caught per trap night)
2000	743	44 (0.058)	135 (0.180)	346 (0.468)
2001	1072	13 (0.012)	161 (0.150)	69 (0.064)
2002	1646	29 (0.018)	218 (0.132)	175 (0.106)

*BOTO (Boreal Toad), LTSA (Long-Toed Salamander), WOFR (Wood Frog).

D. Kananaskis and Area

Year	# Trap Nights	BOTO* Total # caught (# caught per trap night)	CSFR* Total # caught (# caught per trap night)	LTSA* Total # caught (# caught per trap night)	WOFR* Total # caught (# caught per trap night)
1998	1068	33 (0.031)	7 (0.007)	186 (0.174)	61 (0.057)
1999	383	11 (0.029)	2 (0.005)	10 (0.026)	12 (0.031)
2000	522	3 (0.006)	0 (0.000)	6 (0.011)	3 (0.006)
2001	484	11 (0.023)	1 (0.002)	34 (0.070)	8 (0.017)
2002**	1363	39 (0.029)	3 (0.002)	465 (0.341)	213 (0.156)

* BOTO (Boreal Toad), CSFR (Columbia Spotted Frog), LTSA (Long-Toed Salamander), WOFR (Wood Frog).
**In 2002 a new RANA trapping site was established, Kuhn's Pond. The previous site was not operated because the pond dried up by mid-summer for three consecutive years .

Appendix 2 (Cont.). Summary of historic amphibian captures at each RANA site.

E. Lesser Slave Lake Provincial Park

Year	# Trap Nights	BCFR* Total # caught (# caught per trap night)	BOTO* Total # caught (# caught per trap night)	WOFR* Total # caught (# caught per trap night)
1997	724**	8 (0.011)	7 (0.010)	73 (0.101)
1998***	3456	5 (0.001)	23 (0.007)	33 (0.001)
1999	3312	57 (0.017)	114 (0.034)	119 (0.036)
2000	3216	26 (0.008)	84 (0.026)	52 (0.016)
2001	840	29 (0.035)	817 (0.973)	83 (0.099)
2002	1680	299 (0.178)	156 (0.093)	196 (0.117)

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), WOFR (Wood Frog).

**The number of trap nights is an estimate given difficulties interpreting the number of trap malfunctions in the original data.

***One Canadian toad was captured in 1998.

F. Meanook Biological Research Station

Year	# Trap Nights	BCFR* Total # caught (# caught per trap night)	BOTO* Total # caught (# caught per trap night)	WOFR* Total # caught (# caught per trap night)
1997	518	4 (0.008)	3 (0.006)	193 (0.387)
1998	755	4 (0.005)	343 (0.454)	277 (0.367)
1999	630	2 (0.003)	7 (0.011)	23 (0.037)
2000	2090	6 (0.003)	125 (0.06)	36 (0.017)
2001	644	4 (0.006)	8 (0.012)	316 (0.49)
2002	714	1 (0.001)	12 (0.017)	65 (0.091)

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), WOFR (Wood Frog).

G. Saskatoon Island Provincial Park

Year	# Trap Nights	BCFR* Total # caught (# caught per trap night)	BOTO* Total # caught (# caught per trap night)	WOFR* Total # caught (# caught per trap night)
1999	1070	9 (0.008)	0 (0.000)	128 (0.120)
2000	1081	17 (0.016)	2 (0.002)	44 (0.041)
2001	996	5 (0.005)	3 (0.003)	74 (0.074)
2002	980	4 (0.004)	0 (0.000)	165 (0.168)

*BCFR (Boreal Chorus Frog), BOTO (Boreal Toad), WOFR (Wood Frog).

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